REMARKS

The Office Action dated February 13, 2004, has been received and carefully considered. Reconsideration of the outstanding rejections in the present application is respectfully requested based on the following remarks.

At the outset, Applicants note with appreciation the indication on page 3 of the Office Action that claims 3-5, 8-9, 12-14, and 17-18 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, Applicants have opted to defer rewriting the above-identified claims in independent form pending reconsideration of the arguments presented below with respect to the rejected independent claims.

I. THE OBVIOUSNESS REJECTION OF CLAIMS 1, 2, 6, 7, 10, 11, 15, AND 16

On page 2 of the Office Action, claims 1, 2, 6, 7, 10, 11, 15, and 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ramamurthy in the article "Wavelength Conversion in WDM Networking," in view of Jopson (U.S. Patent No. 5,822,476). This rejection is hereby respectfully traversed.

As stated in MPEP § 2143, to establish a prima facie case of obviousness, three basic criteria must be met. First, there

must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Regarding claim 1, the Examiner asserts that Ramamurthy teaches a method for optically converting wavelengths in a multi-wavelength system having W wavelength channels, wherein W=2N, the method comprising the steps of: selectively directing a received frequency channel corresponding to a respective wavelength channel based upon a predetermined frequency mapping (as seen in Figures 9 and 10). The Examiner then acknowledges that Ramamurthy fails to specifically teach shifting the frequency of the selectively directed frequency channel at least once by an amount defined by $\pm 2i\Delta f$, wherein Δf is a frequency spacing between adjacent frequency channels, and i=0, 1,..., N-1. The Examiner then goes on to assert that Jopson teaches that

frequency shifting by an integer of the frequency spacing is well known in the art (column 2, lines 17-50).

However, it is respectfully submitted that Jopson fails to teach or suggest "shifting frequency" in the manner recited in each of the pending independent claims. That is, it is respectfully submitted that Jopson does not teach or suggest shifting the frequency of the selectively directed frequency channel at least once by an amount defined by $\pm 2i\Delta f$, wherein Δf is a frequency spacing between adjacent frequency channels, and $i=0, 1, \ldots, N-1$. Rather, Jopson merely teaches an "output signal" which is selected from a plurality of "discretely separated" optical channels with each channel replicating the optical input signal, but being "spaced apart" from each other by a first fixed frequency separation:

> In yet another embodiment, a frequency translation device for producing a frequency shifted replica of an optical input signal having a desired delay is disclosed. The frequency translation device includes a first comb generator for generating from the optical input signal a first optical frequency comb containing a plurality of discretely separated optical channels with each channel replicating the optical input signal but being spaced apart from each other by a first fixed frequency separation. A first tunable filter having a selected filter frequency and connected to the first comb generator is included for receiving the first optical frequency comb as an input signal to the filter and for selecting from the first frequency comb and outputting from the filter a selected one of the optical channels frequency shifted by a first integer multiple of the first fixed frequency separation of the input signal by selecting

> the filter frequency to pass the desired optical channel.

Col. 2, lines 17-33 (emphasis added).

Clearly, discretely separating from each other a plurality of optical channels by a first fixed frequency separation, as is done in Jopson, is not the same as ***shifting a frequency*** by an amount defined by $\pm 2i\Delta f$, where Δf is a frequency spacing between adjacent frequency channels, and $i = 0, 1, \ldots, N-1$, as required by each of the pending independent claims.

Further, Applicants respectfully submit the Office Action fails to set forth a proper motivation to combine the disclosures of Ramamurthy and Jopson. The cited motivation is based on hindsight from viewing the claims of the present application. Thus, Applicant respectfully submits the Examiner has not met his burden to establish *prima facie* obviousness.

The remaining independent claim (i.e., claim 10) recites related subject matter to the above-identified independent claim, and is therefore allowable for reasons similar to those given above.

The dependent claims 2, 6, 7, 11, 15, and 16, are allowable at least by virtue of their dependency on the above-identified independent claims. Moreover, these claims recite additional subject matter which is not suggested by the documents taken either alone or in combination. For instance, none of the cited

references, either alone or in combination, teach or suggest "shifting the frequency of the selectively directed frequency channel to a higher frequency," as recited in dependent claim 2.

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claims 1, 2, 6, 7, 10, 11, 15, and 16 be withdrawn.

II. CONCLUSION

In view of the foregoing, it is respectfully submitted that the present application is in condition for allowance, and an early indication of the same is courteously solicited. The Examiner is respectfully requested to contact the undersigned by telephone at the below listed telephone number, in order to expedite resolution of any issues and to expedite passage of the present application to issue, if any comments, questions, or suggestions arise in connection with the present application.

To the extent necessary, a petition for an extension of time under 37 CFR § 1.136 is hereby made.

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Respectfully submitted,

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APPENDIX A

1 (Original). A method for optically converting wavelengths in a multi-wavelength system having W wavelength channels, wherein $W = 2^N$, the method comprising the steps of:

selectively directing a received frequency channel corresponding to a respective wavelength channel based upon a predetermined frequency mapping; and

shifting the frequency of the selectively directed frequency channel at least once by an amount defined by $\pm 2^i \Delta f$, wherein Δf is a frequency spacing between adjacent frequency channels, and $i = 0, 1, \ldots N-1$.

2 (Original). The method as defined in claim 1, wherein wavelength channel ordering is preserved by only shifting the frequency of the selectively directed frequency channel to a higher frequency.

3 (Original). The method as defined in claim 2, wherein the shifting of the frequency of the selectively directed frequency channel is constrained such that the frequency of the selectively directed frequency channel is shifted at least once by an amount defined by $+2^{N-1-i}\Delta f$.

4 (Original). The method as defined in claim 3, wherein the shifting of the frequency of the selectively directed frequency channel is further constrained such that the frequency of the

selectively directed frequency channel is shifted at least once by an amount defined by $+2^{N-[1og\kappa]-1-i}\kappa\Delta f$, wherein κ is an integer and $i = 0,\ldots,N-1-\lfloor\log_2 \kappa\rfloor$.

5 (Original). The method as defined in claim 4, wherein the amount by which the frequency of the selectively directed frequency channel is shifted decreases as the number of times the frequency of the selectively directed frequency channel is shifted increases.

6 (Original). The method as defined in claim 1, wherein wavelength channel ordering is preserved by only shifting the frequency of the selectively directed frequency channel to a lower frequency.

7 (Original). The method as defined in claim 6, wherein the shifting of the frequency of the selectively directed frequency channel is constrained such that the frequency of the selectively directed frequency channel is shifted at least once by an amount defined by $-2^{i}\Delta f$.

8 (Original). The method as defined in claim 7, wherein the shifting of the frequency of the selectively directed frequency channel is further constrained such that the frequency of the selectively directed frequency channel is shifted at least once by an amount defined by $-2^{i}\kappa\Delta f$, wherein κ is an integer and $i = 0,\ldots,N-1-\lfloor\log_2 \kappa\rfloor$.

9 (Original). The method as defined in claim 8, wherein the amount by which the frequency of the selectively directed frequency channel is shifted decreases as the number of times the frequency of the selectively directed frequency channel is shifted increases.

10 (Original). An apparatus for optically converting wavelengths in a multi-wavelength system having W wavelength channels, wherein $W = 2^N$, the apparatus comprising:

at least one switching device for selectively directing a received frequency channel corresponding to a respective wavelength channel based upon a predetermined frequency mapping; and

at least one frequency shifter for shifting the frequency of the selectively directed frequency channel at least once by an amount defined by $\pm 2^i \Delta f$, wherein Δf is a frequency spacing between adjacent frequency channels, and $i = 0, 1, \ldots N-1$.

11 (Original). The apparatus as defined in claim 10, wherein wavelength channel ordering is preserved by only shifting the frequency of the selectively directed frequency channel to a higher frequency.

12 (Original). The apparatus as defined in claim 11, wherein the shifting of the frequency of the selectively directed frequency channel is constrained such that the frequency of the

selectively directed frequency channel is shifted at least once by an amount defined by $+2^{N-1-i}\Delta f$.

13 (Original). The apparatus as defined in claim 12, wherein the shifting of the frequency of the selectively directed frequency channel is further constrained such that the frequency of the selectively directed frequency channel is shifted at least once by an amount defined by $+2^{N-[\log\kappa]-1-i}\kappa\Delta f$, wherein κ is an integer and $i=0,...,N-1-\lfloor\log_2\kappa\rfloor$.

14 (Original). The apparatus as defined in claim 13, wherein the amount by which the frequency of the selectively directed frequency channel is shifted decreases as the number of times the frequency of the selectively directed frequency channel is shifted increases.

15 (Original). The method as defined in claim 10, wherein wavelength channel ordering is preserved by only shifting the frequency of the selectively directed frequency channel to a lower frequency.

16 (Original). The apparatus as defined in claim 15, wherein the shifting of the frequency of the selectively directed frequency channel is constrained such that the frequency of the selectively directed frequency channel is shifted at least once by an amount defined by $-2^{i}\Delta f$.

17 (Original). The apparatus as defined in claim 16, wherein

the shifting of the frequency of the selectively directed frequency channel is further constrained such that the frequency of the selectively directed frequency channel is shifted at least once by an amount defined by $-2^{i}\kappa\Delta f$, wherein κ is an integer and $i=0,\ldots,N-1-\lfloor\log_2 \kappa\rfloor$.

18 (Original). The apparatus as defined in claim 17, wherein the amount by which the frequency of the selectively directed frequency channel is shifted decreases as the number of times the frequency of the selectively directed frequency channel is shifted increases.